SMART Ultra-Large-Scale Systems Forum: "Scale Changes Everything," Carnegie Mellon University, Pittsburgh, PA, USA.

On March 6, 2008, the Software Engineering Institute (SEI) conducted a forum, "Scale Changes Everything," on ultra-large-scale (ULS) systems in conjunction with Strengthening the Mid-Atlantic Region for Technology (SMART), a non-profit organization dedicated to integrating regional science and technology activities within Delaware, Maryland, New Jersey, and Pennsylvania. The forum focused on the results of a recent study, *Ultra-Large-Scale Systems: The Software Challenge of the Future*, that was led by the SEI. Held on the Carnegie Mellon University campus in Pittsburgh, PA, the event brought experts involved in the ULS systems study together with community leaders interested in the growing trend toward ultra-large scale systems.

In her opening keynote address, Linda M. Northrop, director of the Product Line Systems Program at the SEI and leader of the SEI ULS systems study, discussed the impact of scale and presented a summary of the key insights from the SEI study. "Software is the least well-understood and the most problematic element of our largest systems today," Northrop said. "Government and industry need to be prepared to build the systems of the future that will be ultra-large scale in many dimensions. We cannot afford to wait or postpone this research."

Later in the morning, John Goodenough of the SEI moderated a panel discussion in which representatives from the community shared their experiences and challenges with increasing scale in their domains. Panelists were John Bloomer, CIO of Virtua Health; Bob Kent, executive director of the System of Systems Security (SOSSEC) Integration Initiative; Patricia Hoffman, principal deputy assistant secretary, Office of Electricity Delivery and Energy Reliability, U.S. Department of Energy; Daniel J. Paulish, Siemens Corporate Research, Inc.; and Mark Uland, the Boeing Company. Links to their presentations are provided under Morning Session below.

Dr. Thomas J. Killion, chief scientist of the United States Army, delivered the afternoon keynote address about ultra-large-scale systems in the Army. He underscored the importance of the ULS systems study and the need for research in this area. The afternoon panel discussion, moderated by Northrop, focused on the promising research areas identified in the SEI study. The panelists, all members of the ULS system study team and coauthors of the report, were Richard P. Gabriel of IBM Research, Douglas C. Schmidt of Vanderbilt University, Kevin Sullivan of the University of Virginia, and Mark Klein, Kurt Wallnau, and John B. Goodenough of the SEI. Each panelist discussed in detail the identified research areas and showcased the results of research that has already been initiated. Links to their presentations are provided under Afternoon Session below.

The event, attended by 80 government and industry leaders and researchers, was followed by an exhibit program and reception where Pennsylvania Lt. Governor Catherine Baker Knoll expressed her

appreciation to the ULS system study team.

Morning Session

Keynote: Northrop, Linda. [Ultra-Large- Scale Systems: Scale Changes Everything](#)

Panel: [Issues of Scale: A Community Perspective](#)

- Bloomer, John. [Virtua Health](#)
- Kent, Bob. [System of Systems Security (SOSSEC)](#)
- Hoffman, Patricia. [Electricity](#)
- Paulish, Daniel. [Ultra-Large-Scale-Systems Development Challenges at Siemens](#)
- Uland, Mark. [System of Systems Common Operating Environment (SOSCOE) Support to Net Centricity](#)

Afternoon Session

Keynote: Killion, Dr. Thomas J. [Enabling Future Technology, Ultra-Large-Scale Systems in the Army](#)

Panel: [Promising Research Areas](#)

- Gabriel, Richard P. [Computational Emergence Research Area](#)
- Goodenough, John. [ULS Systems Research Roadmap](#)
- Sullivan, Kevin. [ULS Ecosystem Design](#)
- Klein, Mark. [Architecture for Ultra-Large-Scale (ULS) Systems](#)
- Schmidt, Douglas C. [Adaptive System Infrastructure for Ultra-Large-Scale Systems](#)
- Wallnau, Kurt. [Applied Computational Mechanism Design](#)